MANEUVERABLE AND ADJUSTABLE

LAWN MOWER HAVING AN EDGING-TRIMMING UNIT

FIELD OF THE INVENTION

The present invention relates to the general field of lawn mowers and is particularly concerned with a maneuverable and adjustable lawn mower having an edging unit.

BACKGROUND OF THE INVENTION

Lawn maintenance typically involves cutting of grass at regular time intervals. The most widely used implement for performing such function is the conventional gasoline or electric engine powered rotary lawn mower.

Although the lawn mower is particularly well suited for cutting relatively large areas of grass, it is often unable to adequately cut grass particularly around plantings, flowers, edges, raised obstructions and the like.

Separate machines are sold for accomplishing such edging and trimming purposes, and they usually include a cutting head having a cutting flail extending therefrom. The cutting head is typically supported on the end of the long handle that can be oriented horizontally for trimming or vertically for edging during use.

Thus, once the lawn is cut with the lawn mower, it is necessary to obtain and use another tool for the final trimming of the lawn. This entails additional costs and requires additional maintenance for the purchasing and care of a separate implement. Furthermore, the use of two separate pieces of equipment increases the overall time required for performing a given task.

Accordingly, the prior art has shown some attempts at designing a combined lawn mower and trimmer thereby allowing the intended operator to trim the lawn without the necessity of obtaining a separate tool located remotely from the lawn mower. However, the prior art attempts have provided generally complex structures requiring substantial

or otherwise undesirable modification to the mower in order to receive the attachment. The prior art attempts have produced structures having undesirable features which the present disclosure seeks to improve.

Another common problem related to conventional grass lawn mowers relates to their lack of maneuverability at least in part related to the configuration of the supporting wheels. This lack of maneuverability provides for an unergonomical handling of the lawn mower leading to frustration and potential injuries to the intended user.

Still further, another common drawback associated with conventional lawn mowers relates to the type of connection between the lawn handle and the lawn mower frame which also deters the overall ergonomic aspects of the lawn mower.

Accordingly, there exists a need for an improved maneuverable and adjustable lawn mower having an edging unit.

Advantages of the present invention include that the proposed lawn mower has a built-in edging unit that can be either directly built onto new models or retro-fitted to conventional models without requiring substantial modifications thereto. The edging unit is of a simple construction so as to provide a unit that will be economically feasible, long lasting and relatively trouble free in operation.

Furthermore, the proposed lawn mower is provided with a three wheel support configuration using a caster-type wheel having a specifically designed height adjustment mechanism. The height adjustment mechanism of the caster-type wheel allows for ergonomical and easy customization of the relative position between the supporting wheel and the lawn mower frame.

Still further, the proposed lawn mower is provided with a lawn mower handle being pivotable about two distinct and substantially orthogonal rotational axis. The lawn mower handle pivotal axis is provided with a releasable locking mechanism for allowing releasable locking thereof in a set of predetermined relative positions relative to the lawn mower frame.

BRIEF DESCRIPTION OF THE DRAWINGS

An embodiment of the present invention will now be disclosed, by way of example, in reference to the following drawings in which :

FIGURE 1 : In a perspective view, illustrates a maneuverable and adjustable lawn mower having an edging unit in accordance with an embodiment of the present invention.

FIGURE 2 : In a partial top view with sections taken out, illustrates part of the body of the lawn mower shown in Figure 1.

FIGURE 3 : In a partial side elevational view with sections taken out, illustrates part of the lawn mower shown in Figure 1 with its handle in a storage configuration.

FIGURE 4 : In a schematic partial top view with sections taken out, illustrates part of the handle unit of the lawn mower shown in Figure 1 with its handle in an operational configuration.

FIGURE 5 : In a schematic partial top view with sections taken out, illustrates part of the handle unit of the lawn mower shown in Figure 1 with its handle in plier pivoted configurations, some of which being shown in phantom lines.

FIGURE 6 : In a partial elevational view with sections taken out, illustrates part of the height adjustment mechanism of the lawn mower shown in Figure 1.

FIGURE 7 : In a partial elevational view with sections taken out, illustrates the mechanism shown in Figure 6 with its locking component being lifted away from the locking base.

FIGURE 8 : In a partial elevational view with sections taken out, illustrates the components shown in Figures 6 and 7 with the locking component being pivoted relative to the locking base and the adjustment knob being rotated so as to decrease the height of the front section of the lawn mower.

FIGURE 9 : In a partial elevational view with sections taken out, illustrates the component shown in Figures 6 through 8 with the locking component being biased back

towards the locking base and the adjustment knob rotated so as to increase the height of the front section of the lawn mower.

FIGURE 10 : In a partial detailed view with sections taken out, illustrates part of the drive mechanism used for driving the edging unit, the drive mechanism being shown in an non operational configuration.

FIGURE 11 : In a partial detailed view with sections taken out, illustrates part of the drive mechanism used for driving the edging unit, the drive mechanism being shown in an operational configuration.

FIGURE 12 : In a partial side view with sections taken out, illustrates part of the locking mechanism for locking the lawn mower handle in a predetermined position. The locking mechanism being shown in the storage position.

FIGURE 13 : In a partial side view with sections taken out, illustrates part of the locking mechanism for locking the lawn mower handle in a predetermined position. The locking mechanism being shown in the operational configuration.

FIGURE 14 : In a partial top view with sections taken out, illustrates the locking mechanism shown in Figures 12 and 13.

DETAILED DESCRIPTION OF THE DRAWINGS

Referring to Figure 1, there is shown a maneuverable and adjustable three wheeled lawn mower **10** in accordance with an embodiment of the present invention. The lawn mower **10** is typically of the walk-behind type and is provided with a frame **12** supporting a rotary engine **14**. The rotary engine **14** is shown as being of a fuel driven type including a fuel compartment **16** but could be of the electrical or other power source type without departing from the scope of the present invention.

As shown in Figure 3, the engine **14** is mounted on the deck of the frame **12** and drives a main engine shaft **18** to which a set of main mower blades **20** are attached. The frame **12** includes a downwardly extending skirt **22** for protectively partially enclosing the blades **20** as is well known in the art.

The lawn mower **10** is preferably of the three wheeled type including a pair of rear wheels **24** rotatably attached to a rear section of the frame **12** and a front caster-type wheel **26** rotatably attached to a caster-type wheel attachment bracket **28**.

A conventional mechanism including a lever **30** for adjusting the relative height between the frame **12** and the rear wheels **24** is also provided. The relative height between the frame **12** and the caster-type front wheel **26** is preferably adjusted using a front wheel-to-frame height adjustment mechanism **32**, illustrated in greater details in Figures 6 through 9.

The lawn mower **10** is typically further provided with a rear wheel driving assembly including a rear wheel driving pulley **194** attached to the engine shaft **18** and a rear wheel driving belt **196** mechanically coupling the rear wheel driving pulley **194** and a driving structure attached to the rear wheel axles **198**.

One of the main features of the present invention resides in the presence of an edging unit **34** attached to the frame **12** and provided with an actuating lever **36** for selectively actuating the driving components of the edging unit **34**. The lawn mower **10** is further provided with a lawn mower handle component **38**.

Another main feature of the present invention resides in the pivotal connection between the handle component **38** and the frame **12**, allowing for relative movement therebetween, as shown in Figures 4 and 5 that will be hereinafter disclosed in greater details.

The engine **14** is typically provided with conventional external components such as a starter rope **40**, having a conventional starter handle **42** and a throttle cable **44**, having a conventional throttle lever **46**. Other relative standard components such as a circuit breaker pivotal rod **48** and the like is also further provided. It should be understood that various other items could be added and that modifications to the herein above disclosed items could be made without departing from the scope of the present invention.

The edging unit **34** includes : a conventional flail member filament **50**, attached in a conventional manner to a driven flail head **52**. The flail head **52** is solidly attached to the frame **12** using a flail head mounting bracket typically including a pair of flail head

mounting legs **54**. Alternatively, the flail head **52** could be pivotally attached to the frame **12** so as to allow the flail head **52** to pivot so that the flail member filament **50** may be rotated between a vertical and a horizontal cutting plane.

Another main feature of the present invention resides in the presence of a guiding wheel **56**, rotatably mounted on a guiding wheel shaft **58** also attached to the flail mounting legs **54**. The guiding wheel **56** has a peripheral surface adapted to rollably abut against guiding surfaces such as edge walls, fences or the like **270**. Alternatively, the guiding wheel **56** could be provided with size adjustment wheels or may be provided with relative positioning means so as to allow customization of the relative position thereof relative to the frame **12** so as to customize its abutment function to different types of environments.

The skirt **22** is provided with a skirt edging unit section **60** extending integrally therefrom. The skirt edging unit section **60** is configured, sized and positioned so as to at least partially enclose the mounting legs **54** while allowing at least a section of the guiding wheel **56** and of the flail member **50** to protrude therefrom. The skirt edging unit section **60** typically protrudes sidewardly and frontwardly from the conventional peripheral edge of the skirt **22** protectively enclosing the cutting blades **20**. As shown in greater details in Figure 2, the skirt edging unit section **60** is provided with an inwardly bent cutting segment **62** defining a sharp cutting edge **64**. The sharp cutting edge **64** is positioned so as to contact the distal end of the flail member **50** when the latter reaches a predetermined length so as to inherently maintain the flail member **50** at a predetermined customized length.

The flail member head **52** is mechanically coupled to the conventional driving cable **68** rotatably inserted within a conventional driving cable sleeve **66**. The driving cable **68** and associated driving cable sleeve **66** typically form an arch from the flail member head **52** towards a rearward section of the lawn mower **10**.

As illustrated more specifically in Figures 10 and 11, the driving cable **68** is mechanically coupled to an edging unit driving shaft **70** extending from an edging unit driven pulley **72**. The edging unit driven pulley **72** is pivotally attached to a base segment **74** of the skirt **22** using a driven pulley attachment unit **76**.

The driven pulley attachment unit **76** includes a first attachment bracket **78** attached to the base wall **74** and a second attachment bracket **80** pivotally attached to the first attachment bracket **78** by a hinge component **82** and also attached to a mounting hub **84** around which the driven pulley **72** rotates. The first attachment bracket **78** is preferably attached to the base wall **74** using conventional fastening means such as bolt **86** and nut **88** arrangements extending through a position adjustment slot **90** formed in the base wall **74** and allowing relative position adjustment between the first attachment bracket **78** and the base wall **74**.

The shaft **70**, the hub **84** and the associated driven pulley **72** are adapted to be pivoted relative to the base wall **74** about the pivotal axis created by the hinge component **82** as indicated by arrow **100** in Figure 11. A clutch cable **94** extending through a clutch cable sleeve **96** is attached to the shaft **70** using an attachment collar **98**. The clutch cable **94** is adapted to be pulled as indicated by arrow **100** by the pivotal movement of the clutch lever **36**.

An edging unit driving belt **102** is wound around the driven pulley **72**. As shown more specifically in Figures 2 and 3, the edging unit driving belt **102** is also wound about an edging unit driving pulley **104**, mechanically coupled to the engine driving shaft **18**.

When the driven pulley **72** is in the inoperative position shown in Figure 10, the edging unit driving belt **102** rotates freely therearound without causing rotation of the driving shaft **70** and associated driving cable **78**. When the actuating lever **36** is pivoted so that the clutch cable **94** pulls the driven pulley **72** in the operative position, shown in Figure 11, the edging unit driving belt **102** becomes taught so that rotation of the edging unit driving pulley **104** is mechanically transmitted to the driven pulley **72** and to the driving cable **68**. In turn, the driving cable **68** causes rotation of the flail member head **52** and the corresponding flail member **50** attached thereto. Optionally, a biasing means could be used to ensure the pivotal movement of the driven pulley **72** towards the inoperative position shown in Figure 10 when the clutch lever **36** is pivoted back to its original position.

Preferably, a set of guarding walls **106** extend from the base wall **74** adjacent the driven pulley **72** so as to form a partial enclosure for preventing potential contact with the rotating components. The protective walls **106** are preferably releasably mounted to the

base wall **74** by conventional fastening means such as bolts **108** so as to allow access to the protected components for maintenance, repairs or the like.

Referring now more specifically to Figures 6 through 9, there is shown in greater details the height adjustment means for adjusting the relative height between the caster-type wheel **26** and the frame **12**. The caster-type wheel mounting bracket **28** is pivotally attached to a caster wheel base plate **110** by a set of conventional roller bearing type components **112**. A caster-type wheel mounting bracket **122** preferably having a generally "L" shaped configuration is attached to the frame **12** with its shorter leg attached to the frame **12** and its longer leg extending frontwardly therefrom.

An adjustment stem **114** extends upwardly from the base plate **110**. The adjustment stem **114**, defines a stem threaded segment **116** positioned proximal to the base plate **110** and a stem attachment segment **118** positioned distally relative to the base plate **110**.

A first locking disc **120** is threatably mounted on the stem threaded segment **116** by an internal threaded collar **124**. The first locking disc **120** is provided with a set of locking recesses **126** formed on its upper peripheral edge **128**. A second locking disc **130** is solidly attached to the stem attachment segment **118** by an attachment screw **132** or any other suitable means. The second locking disc **130** is provided with a set of protruding teeth **134** extending integrally from its lower peripheral edge **136**. The teeth **134** are configured, sized and positioned so as to be insertable within the locking recesses **126** of the first locking disc **120** so as to selectively prevent relative rotation therebetween.

The second locking disc **130** is slidably mounted on a knob spacing segment **140** extending integrally from a knob component **138**. A biasing means for biasing the second locking disc **130** away from the knob component **138** is further provided. The biasing means preferably takes the form of a helicoidal-type spring **142** compressively positioned between the lower face of the knob component **138** and the upper face of the second locking disc **130**.

In order to adjust the relative height between the caster-type wheel **26** and the frame **12**, the intended user merely needs to use his/her finger to grasp the grasping legs **144** and lift the second locking disc **130** away from the first locking disc **120** as indicated by

arrows **146**. The second locking disc **130** is lifted away from the first locking disc **120** until the locking teeth **134** disengage the locking recesses **126** as shown in Figure 7.

As shown in Figure 8, the knob **138** is then rotated according to arrow **148** causing simultaneous rotational movement of the second locking disc **130** attached thereto through the locking screw **132**.

The longitudinal channel **150** formed in the spacing segment **140** allows for vertical displacement of the second locking disc **130** as the threaded segment **116** causes relative vertical displacement between caster-type wheel mounting bracket **122** and the base plate **110** in both vertical directions as shown by arrows **152**. When the desired relative height is reached between the caster-type wheel **26** and the frame **12**, the grasping legs **144** are released and the locking teeth **134** inserted within corresponding locking recesses **126** to prevent relative rotational displacement between the first **120** and second **130** locking discs.

Another main feature of the present invention resides in the configuration of the pivotal connection **154** between the handle **38** and the lawn mower frame **12**. The pivotal connection **154**, as shown in Figures 4 and 5, allows the handle stem **156** to pivot simultaneously in two different geometrical planes relative to the handle pivot axis **158**. A handle pivot sleeve **160** allows pivotal movement of the handle stem **156** according to arrow **162** in a geometrical plane substantially perpendicular to the axis **158** while also allowing pivotal movement of the handle stem **156** in a generally perpendicular geometrical plane as indicated by arrows **164**. The pivotal movement in the perpendicular axis indicated by arrows **164** is at least partially restricted by a stopper bracket **166** extending from the pivotal sleeve **160** and having an abutment leg thereof adapted to abut against the pivotal axis **158** as shown in Figure 5.

Yet another main feature of the present invention resides in a locking means for releasably locking the handle **38** in a predetermined storage configuration. The locking means **168** shown schematically in Figures 4 and 5 is illustrated in greater details in Figures 12 through 14. A rear wheel adjustment brace **170** extends from the base wall **74** in a conventional manner. A locking plate **172** is solidly attached to the brace **170** using weld-lines or any other suitable means. The locking plate **172** is provided with a pair of locking notches **174, 176** formed on its preferably arcuate peripheral edge **178**.

The handle pivotal axis **158** includes a pivotal rod **180** rotatably mounted about a pair of rod pivotal mounting pins **182** — only one of which is shown in Figure 14 — extending through both the brace **170** and the locking bracket **172**. The pivotal rod **180** is adapted to rotate freely about the mounting pins **182** attached to the brace **170.**

A locking handle **184** extends radially from the outer surface of the pivotal rod **180**. The locking handle **184** is provided with a locking pin **186** slidably mounted thereonto. The locking pin **186** is preferably mounted on a locking pin mounting bracket **188** having a guiding pin **190** slidiingly guided through a guiding slot **192** formed in the locking handle **184**.

A biasing means for biasing the locking pin towards its retracted position shown in Figure 14 is further provided. The biasing means preferably takes the form of a helicoidal-type spring **194** attached at a first end thereof to the pivotal rod **180** and at a second longitudinal edge thereof to a spring attachment leg **196** extending from the mounting bracket **188**. The mounting bracket **188** further defines a grasping peg **192** for allowing the fingers of an intended user to slide the mounting bracket **188** and associated locking pin **186** within the guiding slot **192**.

The locking pin **186** is adapted to be releasably inserted within the locking notches **174, 176** for selectively locking the handle stem **156** in either its storage position shown in Figures 3 and 12 or in its operational configuration shown in Figures 1, 4, 5, and 13. The helicoidal-type spring **194** is adapted to prevent unwanted release of the locking pin **186** form the locking notches **174, 176** as is well known in the art.